



NASA ASTROBIOLOGY INSTITUTE ANNUAL REPORT YEAR 6

[July 2003 - June 2004]

Annual Reports :: Year 6 :: Carnegie Institution of Washington

Project Report: Life in Extreme Environments

Baross, J.A. (Submitted, 2004). Habitable zones and the limits of life. In: W.T. Sullivan & J.A. Baross (Eds.). *Planets and Life: The Emerging Science of Astrobiology*. Cambridge, England: Cambridge University Press.

Baross, J.A., Wilcock, W.S.D., Kelley, D.S., DeLong, E.F. & Cary, S.C. (In Press, 2004). The subsurface biosphere at mid-ocean ridges: Issues and challenges. In: W.S.D. Wilcock, D.S. Kelley, J.A. Baross, E. DeLong and S.C. Cary (Eds.). *The Subseafloor Biosphere at Mid-Ocean Ridges. Geophysical Monograph Series, Vol. 144*. Washington, DC: American Geophysical Union.

Bolton, S., Huber, J.A., Embley, R., Butterfield, D.A. & Baross, J.A. (2003). Microbial diversity in subseafloor fluids from Explorer Ridge, northeast Pacific [Abstract]. *Eos, Transactions of the American Geophysical Union*, 84(46, Fall Meeting Supplement): Abstract B12A-0756.

Brazelton, W.J., Schrenk, M.O., Kelley, D.S. & Baross, J.A. (2004). Molecular and organismal characterization of microbial communities at the Lost City hydrothermal field [Abstract]. AbSciCon 2004, NASA Ames Research Center, Moffett Field, CA. *International Journal of Astrobiology*, Supplement 1 (March): 63.

Butterfield, D.A., Lilley, M.D., Huber, J.A., Baross, J.A., Roe, K.K., Embley, R.W. & Massoth, G.L. (2004). Mixing reaction and microbial activity in sub-seafloor hydrothermal upflow zones: Evidence from diffuse flow outcrops across the 1998 Axial Volcano sea-floor eruption area through time. In: W.S.D. Wilcock, D.S. Kelley, J.A. Baross, E. DeLong & S.C. Cary (Eds.). *The Subseafloor Biosphere at Mid-Ocean Ridges. Geophysical Monograph Series, Vol. 144*. Washington, DC: American Geophysical Union.

Cleland, D., Lydell, C., Krader, P., Tang, J. & Emerson, D. (2004). Use of repetitive sequence based PCR (rep-PCR) for genotyping Archaea [Abstract]. *104th General Meeting, American Society for Microbiology, May 2004*, New Orleans, LA.

Cody, G.D. & Scott, J.H. (2003). The roots of metabolism. In: W.T. Sullivan & J.A. Baross (Eds.). *Planets and Life: the Emerging Science of Astrobiology*. Cambridge, England: Cambridge University Press.

Committee on the Origins and Evolution of Life (COEL), National Research Council (Co-Chairs: J.I. Lunine & J.A. Baross with COEL Committee Members). (2003). *Life in the Universe: An Examination of United States and International Programs in Astrobiology*. Washington, DC: National Academies Press.

Druschel, G.K., Emerson, D., Glazer, B., Kraiya, C., Sutka, R. & Luther, G.W. (2004). Environmental limits of the circumneutral iron-oxidizing bacterial isolate ES-1: Field, culture, and kinetic results from voltammetric analyses [Abstract]. Fourteenth Annual V.M. Goldschmidt Conference. *Geochimica et Cosmochimica Acta*, 68 (11, Supplement 1): A387.

Edwards, K.J., Emerson, D., Moyer, C., Staudigel, H., Tebo, B., Bailey, B., Rogers, D. & Templeton, A. (2004). FeMo: An observatory for the study of iron-oxidizing bacteria [Abstract]. Fourteenth Annual V.M. Goldschmidt Conference. *Geochimica et Cosmochimica Acta*, 68 (11, Supplement 1): A393.

Emerson, D. (In Press, 2004). Bacterial iron oxidation at circumneutral pH. In: J.D. Coates & C. Zhang (Eds.). *Iron Cycling in the Natural Environment: Biogeochemistry, Microbial Diversity, and Bioremediation*. Dordrecht, The Netherlands: Kluwer.

Emerson, D. & Weiss, J.V. (In Press, 2004). Bacterial iron oxidation in circumneutral freshwater habitats: Findings from the field and the laboratory. *Geomicrobiology Journal*.

Holland, M. & Baross, J. A. (In Press, 2004). Saganellea petroecbolus, a new genus of Thermococcales isolated from the subseafloor crust following a new deep-sea volcanic eruption. *Applied and Environmental Microbiology*.

Holland, M. E. & Baross, J. A. (2003). Limits of life in hydrothermal systems. In: P.E. Halbach, V. Tunnicliffe & J. Hein (Eds.). *Energy and Mass Transfer in Submarine Hydrothermal Systems* (pp. 235–250). Berlin, Germany: Dahlem University Press.

Holland, M., Baross, J.A. & Holden, J.F. (In Press, 2004). Illuminating subseafloor ecosystems using microbial tracers. In: W.S.D. Wilcock, D.S. Kelley, J. A. Baross, E. DeLong & S.C. Cary (Eds.). *The Subseafloor Biosphere at Mid-Ocean Ridges*. *Geophysical Monograph Series*, Vol. 144. Washington, DC: American Geophysical Union.

Huber, J.A., Butterfield, D.A., Baross, J.A. & Johnson, H.P. (2004). Expanding the subseafloor biosphere to ridge flanks and beyond [Abstract]. AbSciCon 2004, NASA Ames Research Center, Moffett Field, CA. *International Journal of Astrobiology*, Supplement 1 (March): 69.

Huber, J.A., Johnson, H.P., Butterfield, D.A. & Baross, J.A. (Submitted, 2004). Evidence for an active microbial community in 3.5 Ma oceanic crustal fluids. *Science*.

Kaye, J.Z. & Baross, J.A. (In Press, 2004). The combined effects of temperature, pressure and salinity on growth, lipid profiles and protein patterns of four *Halomonas* species. *Applied and Environmental Microbiology*.

Kaye, J.Z. & Baross, J.A. (Submitted, 2004). Phylogenetic diversity of moderately halophilic bacteria from hydrothermal vent and deep-sea environments. *Applied and Environmental Microbiology*.

Kaye, J.Z., Márquez, M.C., Ventosa, A. & Baross, J.A. (2004). *Halomonas neptunia* sp. nov., *Halomonas sulfidaeris* sp. nov., *Halomonas axialensis* sp. nov., and *Halomonas hydrothermalis* sp. nov.: Halophilic bacteria isolated from widely distributed deep-sea hydrothermal-vent environments. *International Journal of Systematic and Evolutionary Microbiology*, 54: 499–511.

Kelley, D.S., Karson, J.A., Fruh-Green, G.L., Yoerger, D.A., Lilley, M.D., Butterfield, D.A., Hayes, J., Shank, T., Schrenk, M.O. & Baross, J.A. (Submitted, 2004). Discovery of a new type of submarine ecosystem: The Lost City hydrothermal field. *Science*.

Krader, P. & Emerson, D. (In Press, 2004). Characterization of Archaea and other environmental bacteria using matrix assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry. *Extremophiles*.

Mehta, M.P., Huber, J.A. & Baross, J.A. (Submitted, 2004). Nitrogen fixing genes reflect physiological heterogeneity in deep-sea archaea. *Applied and Environmental Microbiology*.

Nealson, K.H. & Scott, J.H. (2003). Ecophysiology of the genus *Shewanella*. In: M. Dworkin et al. (Eds.). *The Prokaryotes: An Evolving Electronic Resource for the Microbiological Community*. New York: Springer-Verlag.

Schrenk, M.O., Kelley, D.S. & Baross, J.A. (2004). An iterative microscopic approach to detect and characterize microorganisms within deep-sea hydrothermal ecosystems [Abstract]. AbSciCon 2004, NASA Ames Research Center, Moffett Field, CA. *International Journal of Astrobiology*, Supplement 1 (March): 66.

Schrenk, M.O., Kelley, D.S., Bolton, S. & Baross, J.A. (In Press, 2004). Low archaeal diversity linked to sub-seafloor geochemical processes at the Lost City hydrothermal field, Mid-Atlantic Ridge. *Applied and Environmental Microbiology*.

Schrenk, M.O., Kelley, D.S., Bolton, S. & Baross, J.A. (Submitted, 2003). Carbonate chimneys at Lost City host prolific communities of methane-metabolizing Archaea. *Science*.

Scott, J.H., O'Brien, D.M., Emerson, D., Sun, H., McDonald, G.D. & Fogel, M.L. (In Press, 2004). Examination of the isotopic effects associated with amino acid biosynthesis in microbes. *Astrobiology*.

Sharma, A., Cody, G., Scott, J. & Hemley, R. (In Press, 2004). Molecules to microbes: In situ high-pressure investigations of organic systems under hydrothermal conditions. In: R. Manaa (Ed.). *Chemistry under Extreme Conditions*. Amsterdam, The Netherlands: Elsevier.